App. No. 09/843,597   Request for continued examination under 37 CFR §1.114

AMENDMENT TO THE CLAIMS

Please amend the claims as set forth hereinbelow.

1.-38.   **(cancelled)**

39.   **(currently amended)**   A method comprising dynamically configuring a
configurable programmed holographic structure comprising a set of diffractive
elements and at least one optical port by introduction of energy to the configurable
programmed holographic structure, thereby modifying at least one optical
characteristic of the configurable programmed holographic structure,
~~wherein:~~
wherein, before or after configuring:
the diffractive elements of the set are collectively ~~arranged, before or after~~
~~configuring,~~ arranged so as to comprise temporal, spectral, or spatial
transformation information,
each diffractive element of the set is individually contoured and ~~positioned, before~~
~~or after configuring,~~ positioned so as to reflectively image at least a portion of
an input optical signal between an input optical port and an output optical port
as the input optical signal propagates within the holographic structure,
the diffractive element set ~~transforms, before or after configuring,~~ transforms the
imaged portions of the input optical signal into an output optical signal
according to the transformation information as the optical signals propagate
within the holographic structure between the input optical port and the output
optical port.

40.   **(cancelled)**

41.   **(previously presented)**   The method of claim 39, wherein the energy is
introduced through a conductive trace, the trace coupled to the configurable
programmed holographic structure.

42.   **(previously presented)**   The method of claim 39, wherein the modified optical
characteristic is an index of refraction of a diffractive element.

App. No. 09/843,597   Request for continued examination under 37 CFR §1.114

43.   **(previously presented)**   The method of claim 39, the configurable programmed holographic structure further comprising a plurality of segments, each segment comprising at least one diffractive element, each segment comprising an average index of refraction.

44.   **(previously presented)**   The method of claim 43, wherein the modified optical characteristic is the average index of refraction of at least one segment.

45.   **(previously presented)**   The method of claim 43, each segment comprising a spatial structure.

46.   **(previously presented)** The method of claim 44, the dynamic configuration effected by changing the spatial structure of at least one segment.

47.   **(previously presented)**   The method of claim 43, the configurable programmed holographic structure further comprising at least one gap comprising a material having a refractive index, the at least one gap situated between two adjacent segments, the energy introduced coupling with the at least one gap to effect dynamic configuration.

48.   **(previously presented)**   The method of claim 47, wherein the energy introduced is to change the refractive index of the material.

49.   **(previously presented)**   The method of claim 47, wherein the energy is supplied through at least one conductive trace coupled to the at least one gap.

50.   **(previously presented)** The method of claim 43, wherein a segment comprises a plurality of sub-segments each of which comprises an index of refraction, and wherein the energy introduced coupling with at least one sub-segment is to effect dynamic configuration.

51.-63.   **(cancelled)**

64.   **(previously presented)**   A method comprising:
      configuring a configurable programmed holographic structure to route at least a
            portion of an optical signal between at least one chosen first optical port and at
            least one chosen second optical port, the configurable programmed

Faxed to 703-872-9306 on 05/02/2005   Page 3 of 19

App. No. 09/843,597   Request for continued examination under 37 CFR §1.114

holographic structure comprising a set of diffractive elements and at least one optical port;

receiving via an input optical port at least one optical signal into the configurable programmed holographic structure;

routing at least a portion of the optical signal between the input optical port and an output optical port; and

providing, at the output optical port, the routed portion of the optical signal as an output optical signal,

wherein:

the diffractive elements of the set are collectively arranged, after configuring, so as to comprise temporal, spectral, or spatial transformation information,

each diffractive element of the set is individually contoured and positioned, after configuring, so as to reflectively image at least a portion of the optical signal between the first optical port and the second optical port as the optical signal propagates within the holographic structure,

the diffractive element set transforms, after configuring, the imaged portion of the optical signal into the output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port.

65. **(previously presented)** The method of claim 64, wherein the configurable programmed holographic structure comprises a configurable de-multiplexer.

66. **(previously presented)** The method of claim 64, wherein the configurable programmed holographic structure comprises a configurable multiplexer.

67.-74. **(cancelled)**

75. **(previously presented)**   A method comprising:

applying energy in a time-varying manner to a configurable programmed holographic structure comprising a set of diffractive elements and at least one optical port, the diffractive elements of the set collectively defining a set of program characteristics, at least one of which varies with energy applied to the

App. No. 09/843,597   Request for continued examination under 37 CFR §1.114

configurable programmed holographic structure, thereby varying the set of
program characteristics in a time-varying manner;

receiving an input optical signal via an input port into the configurable programmed
holographic structure, the input optical signal interacting with the diffractive
element set of the configurable programmed holographic structure, thereby
producing a modulated optical signal that is modulated in a time-varying
manner; and

providing the modulated optical signal at an output port,

wherein:

each diffractive element of the set is individually contoured and positioned so as to
reflectively image at least a portion of the input optical signal between the
input port and the output port as the input optical signal propagates within the
holographic structure,

the diffractive element set transforms the imaged portions of the input optical
signal into the modulated optical signal according to the time-varying set of
program characteristics as the optical signals propagate within the optical
medium between the input port and the output port.

76.-80.   **(cancelled)**

81.   **(previously presented)**   A method comprising:

receiving an input optical signal via an input optical port into a configurable
programmed holographic structure comprising a set of diffractive elements and
at least one optical port, the diffractive elements of the set collectively defining
a set of program characteristics and a proper operating wavelength range, the
input optical signal interacting with the configurable programmed holographic
structure;

directing the input optical signal to interact with the configurable programmed
holographic structure, producing an output optical signal having an output
power at an output optical port;

directing the output optical signal onto a power measurement device; and

App. No. 09/843,597   Request for continued examination under 37 CFR §1.114

modifying the program characteristics of the configurable programmed holographic
structure to maximize the output power, as measured by the power
measurement device,

wherein:

each diffractive element of the set is individually contoured and positioned so as to
reflectively image at least a portion of the input optical signal between the
input port and the output port as the input optical signal propagates within the
holographic structure,

the diffractive element set transforms the imaged portions of the input optical
signal into the output optical signal according to the set of program
characteristics as the optical signals propagate within the optical medium
between the input port and the output port.

82. **(previously presented)**   The method of claim 81 further comprising modifying
the set of program characteristics by applying an energy to the configurable
programmed holographic structure, for which at least one of the set of program
characteristics varies with energy applied to the configurable programmed
holographic structure.

83.-84.   **(cancelled)**

85. **(previously presented)**   The method of Claim 39, wherein the diffractive
elements of the set are collectively arranged, before or after configuring, so as to
exhibit positional variation in amplitude, optical separation, or spatial phase over
some portion of the set.

86. **(previously presented)**   The method of Claim 85, wherein:

the diffractive elements of the set are collectively arranged, before configuring, so
as to exhibit positional variation in amplitude, optical separation, or spatial
phase over some portion of the set; and

the diffractive elements of the set are collectively arranged, after configuring, so as
to exhibit altered positional variation in amplitude, optical separation, or spatial
phase over some portion of the set.

App. No. 09/843,597   Request for continued examination under 37 CFR §1.114

87. **(previously presented)**   The method of Claim 39, wherein the diffractive element set transforms, before configuring, the imaged portions of the input optical signal into the output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port.

88. **(previously presented)**   The method of Claim 87, wherein the diffractive element set transforms, after configuring, the imaged portions of the input optical signal into an altered output optical signal according to altered transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port, the altered output optical signal differing from the output optical signal in temporal waveform, optical spectrum, or spatial wavefront.

89. **(previously presented)**   The method of Claim 87, wherein the diffractive element set transforms, after configuring, the imaged portions of the input optical signal into an altered output optical signal according to altered transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port, the altered output optical signal differing from the output optical signal in temporal waveform or optical spectrum.

90. **(previously presented)**   The method of Claim 87, wherein configuring the holographic structure results in substantial elimination of the output optical signal.

91. **(previously presented)**   The method of Claim 39, wherein the diffractive element set transforms, after configuring, the imaged portions of the input optical signal into the output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port.

92. **(previously presented)**   The method of Claim 91, wherein the output optical signal is substantially absent before configuring.

93. **(previously presented)**   The method of Claim 39, wherein the input optical port and the output optical port comprise a common optical port.

Faxed to 703-872-9306 on 05/02/2005   Page 7 of 19

App. No. 09/843,597   Request for continued examination under 37 CFR §1.114

94. **(previously presented)**   The method of Claim 39, wherein the input optical port and the output optical port comprise distinct optical ports.

95. **(previously presented)**   The method of claim 39, wherein the holographic structure comprises a planar waveguide substantially confining in one dimension the optical signals propagating in two dimensions therein.

96. **(previously presented)**   The method of claim 39, wherein the energy introduced is electromagnetic energy.

97. **(previously presented)**   The method of claim 39, wherein the energy introduced is thermal energy.

98. **(previously presented)**   The method of claim 39, wherein the energy introduced is photonic energy.

99. **(previously presented)**   The method of claim 39, wherein the energy introduced is acoustic energy.

100. **(previously presented)**   The method of claim 39, wherein the energy introduced is nuclear energy.

101. **(previously presented)**   The method of claim 39, wherein the energy introduced is chemical energy.

102. **(previously presented)**   The method of claim 39, wherein the energy introduced is electrical energy.

103. **(previously presented)**   The method of Claim 41, wherein at least one conductive trace is positioned and contoured so as to substantially correspond to one of the diffractive elements.

104. **(previously presented)**   The method of Claim 41, wherein the energy is introduced through multiple conductive traces, the multiple conductive traces comprising at least two subsets, the energy introduction through each subset of the multiple conductive traces being independently controlled.

105. **(previously presented)**   The method of Claim 64, wherein the diffractive elements of the set are collectively arranged, before or after configuring, so as to

App. No. 09/843,597   Request for continued examination under 37 CFR §1.114

exhibit positional variation in amplitude, optical separation, or spatial phase over some portion of the set.

106. **(previously presented)**   The method of Claim 105, wherein:

the diffractive elements of the set are collectively arranged, before configuring, so as to exhibit positional variation in amplitude, optical separation, or spatial phase over some portion of the set; and

the diffractive elements of the set are collectively arranged, after configuring, so as to exhibit altered positional variation in amplitude, optical separation, or spatial phase over some portion of the set.

107. **(previously presented)**   The method of Claim 64, wherein:

the diffractive element set transforms, before configuring, the imaged portions of the input optical signal into an initial output optical signal according to initial transformation information as the optical signals propagate within the holographic structure between the first optical port and the second optical port; and

the initial output optical signal differs from the output optical signal in temporal waveform, optical spectrum, or spatial wavefront.

108. **(previously presented)** .   The method of Claim 64, wherein:

the diffractive element set transforms, before configuring, the imaged portions of the input optical signal into an initial output optical signal according to initial transformation information as the optical signals propagate within the holographic structure between the first optical port and the second optical port; and

the initial output optical signal differs from the output optical signal in temporal waveform or optical spectrum.

109. **(previously presented)**   The method of Claim 64, wherein the output optical signal is substantially absent before configuring.

110. **(previously presented)**   The method of Claim 64, further comprising re-configuring the configurable programmed holographic structure to route at least a

App. No. 09/843,597   Request for continued examination under 37 CFR §1.114

portion of an optical signal between the first optical port and the second optical port, wherein:

the diffractive elements of the set are collectively arranged, upon the configurable programmed holographic structure being re-configured, so as to comprise altered temporal, spectral, or spatial transformation information,

the diffractive element set transforms, upon the configurable programmed holographic structure being re-configured, the routed portion of the optical signal into an altered output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the first optical port and the second optical port, the altered output optical signal differing from the output optical signal in temporal waveform, optical spectrum, or spatial wavefront.

111. **(previously presented)**   The method of Claim 110, further comprising re-configuring the configurable programmed holographic structure so as to substantially eliminate the output optical signal.

112. **(previously presented)**   The method of Claim 64, wherein the first optical port and the second optical port comprise a common optical port.

113. **(previously presented)**   The method of Claim 64, wherein the first optical port and the second optical port comprise distinct optical ports.

114. **(previously presented)**   The method of claim 64, wherein the holographic structure comprises a planar waveguide substantially confining in one dimension the optical signals propagating in two dimensions therein.

115. **(previously presented)**   The method of claim 64, wherein the holographic structure is configured by introducing energy into the holographic structure through a conductive trace, the trace coupled to the configurable programmed holographic structure.

116. **(previously presented)**   The method of Claim 115, wherein at least one conductive trace is positioned and contoured so as to substantially correspond to one of the diffractive elements.

App. No. 09/843,597   Request for continued examination under 37 CFR §1.114

117. **(previously presented)**   The method of Claim 115, wherein the energy is introduced through multiple conductive traces, the multiple conductive traces comprising at least two subsets, the energy introduction through each subset of the multiple conductive traces being independently controlled.

118. **(previously presented)**   The method of Claim 75, wherein the diffractive elements of the set are collectively arranged so as to exhibit positional variation in amplitude, optical separation, or spatial phase over some portion of the set.

119. **(previously presented)**   The method of Claim 75, wherein the input optical port and the output optical port comprise a common optical port.

120. **(previously presented)**   The method of Claim 75, wherein the input optical port and the output optical port comprise distinct optical ports.

121. **(previously presented)**   The method of claim 75, the programmed holographic structure further comprising a variable spatial structure, and wherein varying the set of program characteristics comprises varying the spatial structure.

122. **(previously presented)**   The method of claim 75, wherein the energy is applied to the holographic structure through a conductive trace, the trace coupled to the configurable programmed holographic structure.

123. **(previously presented)**   The method of Claim 122, wherein at least one conductive trace is positioned and contoured so as to substantially correspond to one of the diffractive elements.

124. **(previously presented)**   The method of Claim 122, wherein the energy is introduced through multiple conductive traces, the multiple conductive traces comprising at least two subsets, the energy introduction through each subset of the multiple conductive traces being independently controlled.

125. **(previously presented)**   The method of claim 75, further comprising applying the energy through a conductive trace which is coupled with the programmed holographic structure.

App. No. 09/843,597　　　　　　Request for continued examination under 37 CFR §1.114

126. **(previously presented)**　　The method of claim 75, wherein the input optical signal interacts with the configurable programmed holographic structure to produce one of an optical signal encoded with multi-level phase shift key coding, and a multi-level phase shift key-decoded optical signal.

127. **(previously presented)**　　The method of claim 75, the programmed holographic structure further comprising a gap situated between two adjacent diffractive elements, the gap comprising an index of refraction, and wherein changing a program characteristic further comprises changing the index of refraction of the gap.

128. **(previously presented)**　　The method of claim 75, the programmed holographic structure further comprising at least one segment, and wherein varying a program characteristic further comprises changing the index of refraction of the at least one segment.

129. **(previously presented)**　　The method of claim 75, wherein the holographic structure comprises a planar waveguide substantially confining in one dimension the optical signals propagating in two dimensions therein.

130. **(previously presented)**　　The method of Claim 81, wherein the diffractive elements of the set are collectively arranged so as to exhibit positional variation in amplitude, optical separation, or spatial phase over some portion of the set.

131. **(previously presented)**　　The method of Claim 81, wherein the input optical port and the output optical port comprise a common optical port.

132. **(previously presented)**　　The method of Claim 81, wherein the input optical port and the output optical port comprise distinct optical ports.

133. **(previously presented)**　　The method of claim 81, wherein the holographic structure comprises a planar waveguide substantially confining in one dimension the optical signals propagating in two dimensions therein.

134. **(previously presented)**　　The method of claim 81, wherein the program characteristics are modified by introducing energy into the holographic structure

App. No. 09/843,597   Request for continued examination under 37 CFR §1.114

through a conductive trace, the trace coupled to the configurable programmed holographic structure.

135. **(previously presented)**   The method of Claim 134, wherein at least one conductive trace is positioned and contoured so as to substantially correspond to one of the diffractive elements.

136. **(previously presented)**   The method of Claim 134, wherein the energy is introduced through multiple conductive traces, the multiple conductive traces comprising at least two subsets, the energy introduction through each subset of the multiple conductive traces being independently controlled.